

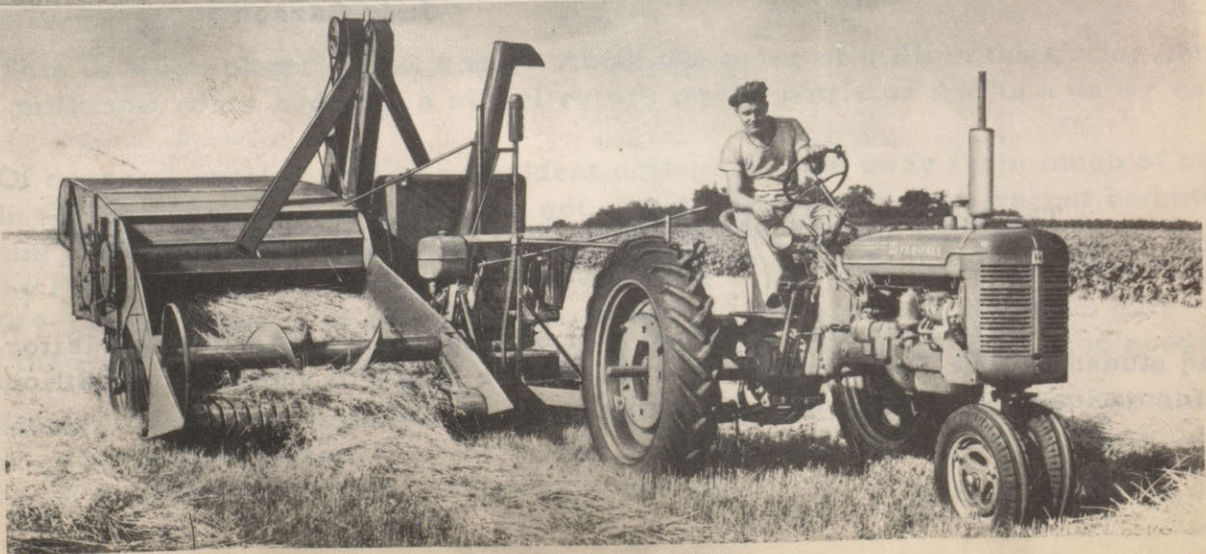
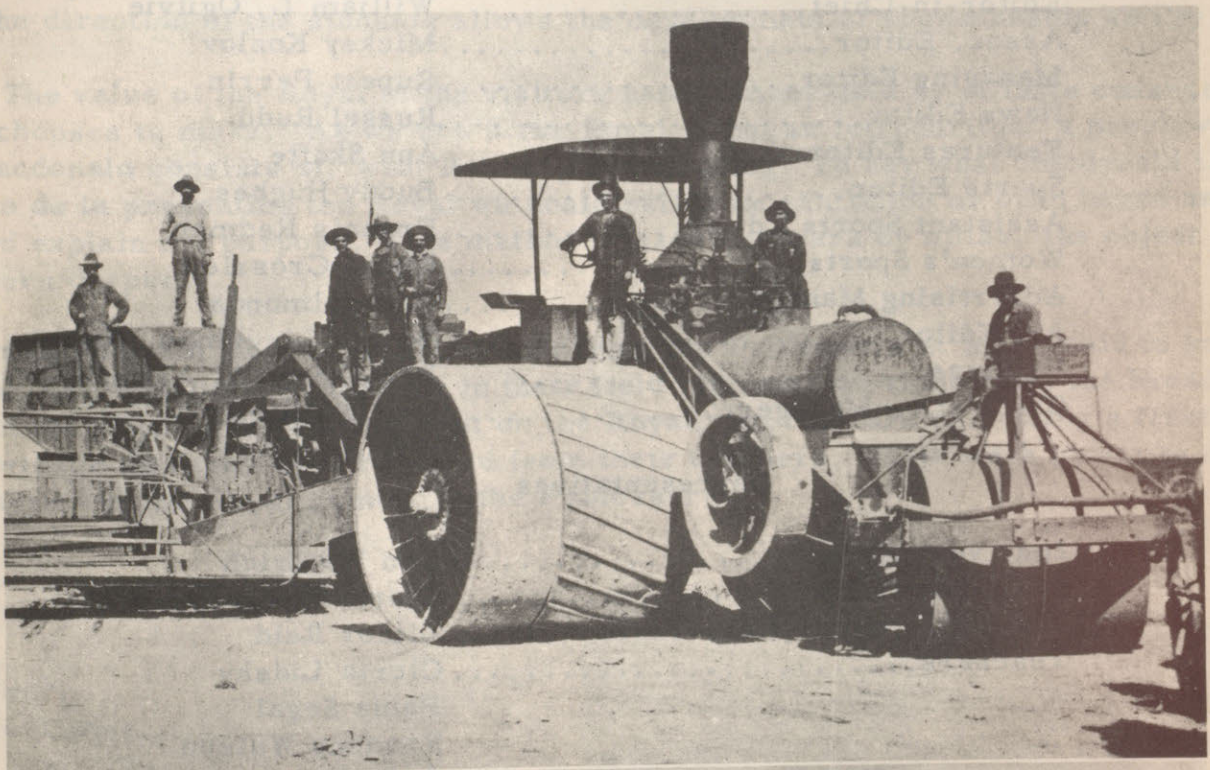
Fault-De Times



Vol 17 No. 15

Feb. 22, 1955.

Our Macdonald Royal Parade of Achievements



FAILT-YE TIMES

Published Weekly by the Board of Publications
Macdonald College, Quebec

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The Editor would like to thank the Professors who contributed subject matter for this issue of the paper.

We are sure the material will be of great interest to our visitors and students. The Failt-Ye Times staff will be happy to supply any additional information that is available on the topics mentioned.

EDITORIAL

The Royal has become an established institution at Macdonald College. To the visitor or student the Royal can give you only what you make it.

The Macdonald Royal provides an interesting and profitable sidelight for the student not found in lectures or labs. Experiences in organizing, directing or managing an undertaking such as the Royal are important in developing that rounded education that is highly valued today. This tie with the agricultural populace of the district and the various friends of the college helps to put a crack in the shell that surrounds the College activities.

Industry is fully realizing the major influence students who have specialized in the theory of some phase of production, working in an extension capacity, have on income.

There has been an increasing number of graduates in the past few years who have moved into positions with industry in an advisory or demonstrator capacity. The Royal under the direction of the students allows the development of showmanship ability.

The value of the Royal to the visitors can be many-fold or of little consequence, as one chooses to make. As we see it the Royal is but an introduction, a preview of what Macdonald consists of, what it is capable of doing. To say what Macdonald is trying to do in presenting the Royal we could call it an exhibition or open house and let the word explain the purpose. This method misses the mark by miles, the object of the Royal goes deeper.

One does not have to take lectures from the Professors at Macdonald to know that they can be classed as authorities in their field. Herein, we think, lies the bread and butter of the Royal. The students put on the Royal, but they are only using a fraction of the knowledge that they have received from their teachers. Their work points to the Professors and the Royal points, to the Professors.

W.L.O.

The Editor,
Fair-ye Times.

Dear Sir:-

This is a complaint. What about? About the price of milk in the Coffee Shop. One quart of milk now costs 30¢ with a nickel return on the bottle or 25¢ in a paper carton.

Of course I realize that in a resident college we are away from much of current affairs in the business world but we are not cut off completely. In a recent communique from home I was informed that milk can still be bought for 20¢ per quart from the milkman. Why then do students here at the college have to pay 25% more for milk bought by the bottle? I am not aware of any blockade or tariff regulations at the main gate, nor do I see that this price for milk is offset by low prices on other Coffee Shop goods we buy.

Many students are asking the same or similar question I am, and it is my sincere hope that either a satisfactory answer to this question will come from our Coffee Shop executive or the price of milk be returned to normal.

Robert H. Shone.



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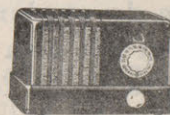
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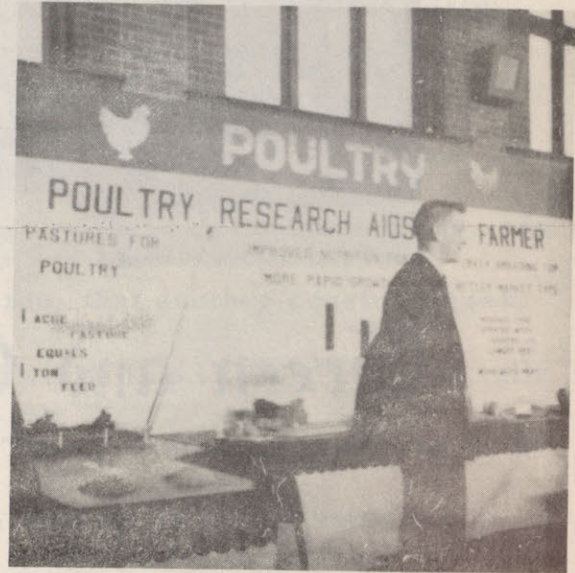
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Review of

THE HOUSE WITH THE TWISTY WINDOWS

Darkness, fear, tension -- 3 scared people in a dismal room behind the Iron Curtain -- refugees from persecution. This atmosphere predicated the unravelling of the play, "The House With The Twisty Windows."

Anna, one of the members of the family, not at the scene, is being questioned by the police. She knows that her cousin, Dickie, has committed some crime. She knows, too, that another cousin, Derek, a renowned "story-teller" is confined within this little room. He tells us the story of "The House With The Twisty Windows," partly to relieve the strong tension of foreboding doom. Derek is at this room for he is believed to be the one responsible for this crime. Anna confirms his guilt to the police, and we see the honour of a man risking his life to save another -- we see the futility in Anna after making her vow and sentencing the wrong man.

This story is a living example of Old English tradition of, "chin up, old chap." The choice of the story is excellent! Each of the participants -- Margot Foulkes, Gheta Gordon, Angela Barton, Doug Walker, Ron Roberts, John Gormley -- portrayed their roles with great character. However, it is thought, that the lines were too hard to hear in spots, and perhaps over-dramatic in others. The great strain of the impending doom, perhaps made the audience too tense.

However, we are sure that the play, "The House With The Twisty Windows" scored as big a hit in Ottawa, when it went to compete against other colleges for top dramatic honours, as it did when performed for

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February 23-26, Wed.-Sat.

ATHENA (Tech.)
Jane Powell Vic Damone
& Debbie Reynolds

---also---

CAPTAINS PARADISE

Sports

WOMEN'S SPORTS

Senior Girls' Basketball

Macdonald's Senior Basketball team played their last league game Saturday, February 12, losing to McGill in a closely fought game with a score of 32-22.

McGill got off to a fast start and built up a lead during the first quarter of the game. The game was cleanly played as compared to the game against Y.W.C.A., thus few fouls were called against either team. The guards for Mac played well and helped to keep the score down. The guards were: Fay Armstrong, Dot Johnson, Fran Watson, Audrey McOuat, and Margie Webster. Caroline Davis and Janet McWha led the scoring for Mac assisted by Joyce MacEwen, Judy Herder and Inge Oelman.

Interclass Hockey Points

	<u>Points</u>	<u>Bonus</u>	<u>Total</u>
Elementary	15		15
Freshie Intermediate	62	25	87
Soph. Int.	66	50	116
Home Ec. I	46		46
Home Ec. II	55	10	65
Home Ec. III	40		40
Home Ec. IV	0		0
I Yr. Int. & Hmkrs.	-4		-4
Kind. & Handi.	-21		-21

Class Standing as of February 10.

	<u>Points</u>
Elementary	141
I Yr. Int. Kind. & Handi.	- 12 1/2
Freshie Int.	299 3/4
Soph. Int.	417 1/2
Home Ec. I	143 1/2
Home Ec. II	257
Home Ec. III	136 1/2
Home Ec. IV	38

BERARD SCORES HAT-TRICK

"Jafree" Berard took the spot light last Wednesday evening as the Grads defeated the Aggies 4-3. "Jake" opened the scoring in the opening stanza and followed up with a second goal in the second period to put the Grads out in front 2-0. The hat trick goal, also a winning one, came in the last minute of play with both teams squared off at three goals each.

The Grads dominated the play for the first two periods taking a 1-0 lead in the first period and stretching it to a 3-1 lead by the end of the second, with Glen and Burke each adding one for their respective teams. The Aggies were held well in check and on occasion when they broke through the Grad defense Massicott, who played a very good game in the nets, was there to stop them. Between the second and third period, Coach Bob Pugh found it very appropriate to deliver a most inspiring lecture to his boys, who, up to now have remained invictorious in five starts. The effect could easily be seen in the final stanza as the Aggies completely dominated the play. Boswell and Donaldson both dented the twine to tie the score at 3-3 with George Massicott kicking out the rubber time and time again. "Jake" Berard broke loose in the last minute of play to beat McNeil and give the Grads a 4-3 victory.

JUNIORS; LOSE 55-43, WIN 33-23

The Macdonald Junior Basket Ball team were defeated in the first of two games by the S.G.W. Juniors last Wednesday night by the score of 55-43.

The game got under way with S.G.W. playing a very close man to man ball game. The Aggies were playing sloppy ball in the first quarter and accumulated many fouls, which the S.G.W. team took advantage of. As the game proceeded both teams settled down to play better basketball with the half-time score showing S.G.W. out in front 25-23.

In the second half the Mac Juniors fell behind from the start and although they were playing better basketball they never came close to regaining the lead. The final whistle blew with Sir George Williams 55- Mac Juniors 43.

Saturday evening the Junior team played host to the Macdonald High School. In the early minutes of the game the High School took a 10 point lead showing a great deal of improvement over their previous meeting with the Juniors. As the game progressed the Juniors came back and gradually cut down the lead until they were tied at 19 points each at half time.

Early in the second half the Juniors started to penetrate the zone defense of the High School. The High School kept them from increasing their lead until the dying minutes when finally the Juniors broke loose to add 10 points to the score. The game ended with the Juniors winning 33-23.

Features

RESEARCH IN DEPARTMENT OF CHEMISTRY

Animal Biochemistry Group

The main research interests are (1) the biochemistry of the domestic fowl, (2) the effects of high temperatures on edible vegetable oils, (3) the chemistry and technology of milk products and of casein and other proteins, and (4) the synthesis of C^{14} labeled compounds.

The work on the fowl is largely concerned with the effects of sex hormones and thyroxine on the composition of body tissues and on mineral metabolism. The experiments are carried out in collaboration with the Poultry Department. Typical recent studies have dealt with the rate of renewal of serum proteins. The effects of androgen and estrogen on the skeleton have been studied with the aid of radioactive calcium.

The work on heated oils is carried on in collaboration with the Department of Nutrition and is concerned with the effects of high temperatures on nutritive value as well as on chemical constitution

Research on milk products has been largely prompted by the desirability of improving the flavour of protein hydrolyzates for use in therapeutics. This research now includes fundamental practical studies on protein hydrolysis, and much pioneer work has been done on the use of sulphurous acid for hydrolyzing proteins.

The nature of these researches involves constant attention to developments in analytical biochemistry, and a good deal of attention is given to this area. The Department has had some success in improving the ease and accuracy of existing methods for the amino acid analysis of proteins by quantitative paper chromatography. Again, a recent research project on the glyco-proteins of the fowl's body involved a detailed study of the available method for determining hexosamine; it was found possible not only to improve the existing method, but also to introduce a simplified method directly applicable to tissue samples.

The work on the synthesis of C^{14} labeled compounds was initiated to provide tagged compounds for use in biological studies. Radioactive DDT and phenylalanine have been synthesized and a method for the synthesis of stilbestrol has been worked out.

Soil and Plant Group

Since soils are the media in which plants grow naturally, the chemistry of soils is closely interrelated with that of plant nutrition. It seems logical to study both concurrently. In this general field, post-graduate students currently are studying the

changes in composition of the timothy and the corn plants with development and as a result of application of nitrogenous and phosphatic fertilizers to the soils on which they are grown; others are studying the kinds of minerals and the compounds of phosphorus occurring in soils and the relation of these to the origin of the soil and to plant nutrition.

RESEARCH IN THE PHYSICS DEPARTMENT

The Department of Physics is responsible for teaching mathematics and physics and, in addition, takes a keen interest in research. Much of this research is of a cooperative nature. Records show that joint research has been carried on with almost all the other agricultural departments.

At present radioactive tracer work is flourishing, and there are joint projects with Chemistry, Entomology, Poultry, Nutrition and Parasitology. These include studies of the movement of phosphorus in soils and plants, the action of D.D.T. and other poisons upon insects, problems of metabolism in domestic fowl, and other projects.

The general plan in tracer work is to use radioactive atoms to label molecules in chemical compounds. When a molecule has been thus labeled, its future movements in the plant or animal body, may be traced. This is possible because radioactive atoms emit signals which can be detected and measured electronically. This modern method is very powerful and has many possible applications.

Earlier work upon soil dealt with capillary and osmotic forces, while later studies dealt with physical properties related to texture and structure. Two valuable techniques for studying the finer soil particles are used here, viz. x-ray analysis and differential thermal analysis. In the last mentioned technique a small sample of clay is placed in a special oven which is rapidly heated to 1000°C . Meanwhile careful observations are made of the temperature of the clay. Small irregularities in the rate of temperature rise are used in the analysis.

Some years ago an excellent quartz spectrograph was constructed in the department and one of its uses has been to measure the distribution of boron in turnips, boron being a key element in the disease known as turnip brown-heart.

The department is equipped with a table-model electron microscope. This has been used to photograph the virus responsible for tobacco mosaic and to search for other viruses. A very good ultra-sonic generator has been constructed and this too is available for appropriate investigations.

One of the latest research tools to be added to those already mentioned is a large mass spectrograph. This is used for tracer experiments with elements having no suitable radioactive components but having abnormal isotope ratios. The test-atoms are separated, traced, and measured by their masses instead of by radioactivity. The instrument is the first in Canada to be devoted primarily to agricultural research.

RESEARCH IN THE DEPARTMENT OF BACTERIOLOGY

The research projects receiving attention in the department of Bacteriology may be placed in three main categories: soil, food, and physiology. Fundamental research in soil microbiology does not seem to be receiving the support or interest in Canada in proportion to its importance. This importance may be emphasized by the simple acknowledgement that one of the main factors contributing to civilization is the activity of microorganisms in the soil. It is appropriate, therefore, that some of our research at Macdonald College should continue investigations into the nature of soil microorganisms. We have limited these investigations, because of the lack of workers, to two main studies: firstly, methods of rebuilding soil organic matter through the activity of microorganisms, and secondly, specific effects of certain microorganisms on the growth of barley and oats; both are long-term projects. Many other studies, especially those related to soils of Quebec and of the Maritime provinces, remain to be investigated.

Our research in food microbiology is devoted to a long-term study of the microbiology of fruits and fruit products. We are studying the changes of microflora that occur on apples while the fruit matures on trees in various orchards in Quebec, and while the fruit is kept in cold storage at Macdonald College. Factors that affect the rate of fermentation of apple juice are being investigated. We are also searching for new yeasts that may be useful to industries engaged in the production of cider or apple champagne.

Our studies of the Physiology of microorganisms are made generally in relation to some specific aspect of soil or food microbiology. One project deals with the production of fluorescent pigments by bacteria and yeasts. Some fluorescent materials are formed by certain plants and presumably go into the soil when the plant dies and may become decomposed by soil microorganisms or possibly suppress the growth of some kinds. Fundamental research is being done, therefore, to obtain information about the effect of some fluorescent alkaloids on the nutrition and growth of microorganisms. We are also investigating the physical and nutritional factors that affect the rate of production of acetic acid from alcohol by a specific group of bacteria; the results of these studies should have both academic and industrial importance in that there does not seem to be any evidence of previous work of this kind having been done. Our work with apples led to the discovery of a yeast that had not been previously described and which does not seem to be capable of fermenting any of the common sugars. Another yeast was found which, though previously described, seems to have the peculiar ability of growing in distilled water. We are studying the metabolism of these two yeasts.

Microbiology is a relatively young science that has grown and spread from the work of Louis Pasteur and his contemporaries. Agricultural and industrial microbiology have been developed to a place of importance only in the past few decades. This importance was sufficiently recognized, however, so that when Macdonald College was founded a department of bacteriology was established. Under the direction of Dr. Harrison the research of the department was done mainly in food bacteriology. Dr. Gray, the present chairman, has developed research in soil microbiology and initiated the course in bacterial physiology; he has encouraged, in recent years, increasing research in food microbiology, which has been made possible by the addition of a third member to the staff of the department, Mr. D. S. Clark.

The present teaching policy of the department is to instruct the undergraduate students in the fundamental principles that have become established in microbiology and to direct the graduate students toward a sound and critical appreciation of new developments in the science. Students who have chosen the "bacteriology option" have been successful, after graduation, in obtaining employment in agriculture, public hygiene, or industry. But not all have chosen to continue to work as bacteriologists; indeed one of our best past students is successfully writing for the Canadian Broadcasting Corporation!

The staff of the department.

CURRENT RESEARCH IN ENTOMOLOGY AT MACDONALD

A surprising variety of studies are being carried on by the staff and graduate students in entomology at Mac. Of necessity much of the outdoor work is transferred to government laboratories and stations in the summer. Dr. DuPorte is continuing his long term studies on the homologies and development of the present body structures of different insect species. Mr. R.D. Wallace is concerned with variations in structure which occur within a species of sawfly that feeds on Jack pine. Mr. Cal Sullivan is investigating how white pine weevil is affected by temperature, light, etc. Both these men do their work in summer at the Forest Biology Laboratory at Sault Ste. Marie. Dr. Morrison is cooperating with Professor Steppeler in a study of the importance of habits of a little bark beetle that bores into the roots of red clover and which, he feels, is a factor in reducing stands and yields and in preventing this crop from carrying over into a third year.

Mr. E. Hagley and Dr. Morrison are investigating, by means of radioactive tracer techniques, why certain chemicals, innocuous in themselves, greatly enhance the effect of DDT against some house flies and not against others. They hope by this means to farther elucidate the reasons for insect resistance to certain insecticides.

Mr. Deane Read is trying to find why turnip maggot flies emerge at one time of year from some soils and much later from others. He is tackling the problem both in the field in P.E.I. and here under controlled conditions. Mr. Gourhi has been rearing tiny parasites which feed on mealy bugs which in turn injure citrus trees. He began last summer in California and continued here under indoor conditions. He plans to begin in a few weeks another study of the effects of physical factors on the life and behaviour of the house cricket which, though a nuisance in houses here, is a field pest in Pakistan. Professor Whitehead, when time permits, is collecting records of, and information on, the ectoparasites of birds and mammals in Quebec.



HISTORY OF THE ANIMAL HUSBANDRY CLUB

by Glenn S. Ells (Animal Husbandry '55)

The Macdonald College Live Stock Club was formed in October, 1920 and was a revival of the original Club which was abandoned during World War I. Professor Barton was the first Honorary President and R. Jones was the President. P.D. Brogg and M.B. Paige were also on the executive. This Club used to be very active; holding two meetings per month and hearing many speakers. The Club voted money to assist members to attend the Ottawa Winter Fair. They even persuaded the staff to send livestock judging teams to Chicago. To quote from the minutes of October 21, 1921: "It was moved by Mr. Armitage, seconded by Mr. Brighton that the Club aid in every possible way the sending of a Live Stock judging team to the International Fair at Chicago." The motion was carried and the December 17th minutes mention a report given by the team that competed at Chicago.

There was no College Royal during these years, but the Club used to sponsor, annually, a Mock Cattle Sale. Students in the Club used to give lectures at the meetings and enthusiasm was running high. Mr. Barton commended the policy of making the sale an annual affair, of instituting a show, an interyear judging competition, a feeding contest consummated in a show, and the final exhibition in Ottawa of the winning steers, etc. -- more extensive market trips, demonstrations and practice in: harnessing, hitching, halter breaking, showing, driving, calf feeding, etc. Things were really rolling and in 1922 the Mock Sale included 64 head of cattle, sheep, horses and swine. The Club carried on during '22 - '23 with "every other Monday night the night for L.S.C. meetings." Things must have gotten so big that they were out of proportion to the time available

because the Club wasn't reorganized in the Fall of 1923.

At a meeting of the Animal Husbandry option on February 5, 1948, it was moved and passed that "the Animal Husbandry Club of Macdonald College be re-organized." There were a lot of "returned men" or "vets" going through college during this time. The Animal Husbandry students decided that they wanted more practical contact with livestock. Professor Ness was unanimously elected Honorary President of the reorganized Club. Other officers were: President R.A. Foreman, Vice-President J.M. Elliot, Secretary-Treasurer, F.H. Peters, and executive members: B.S. Watson, Bobby Ness, and M.M. Templeton. There was a membership of 55 that year. It was during this year that the College Royal started at Macdonald. It had its beginnings in the Animal Husbandry Club livestock show, but the "College Royal" idea soon took hold in all departments and the Royal as we know it today rapidly developed. The biggest undertaking of the Royal -- the Livestock show is still run by the Animal Husbandry Club.

Despite the very crowded extra curricular schedule now encountered by Macdonald students, the Club still finds time to give those interested in livestock "something extra" that isn't obtained at lectures. This is accomplished by bringing in speakers, showing films, holding discussions, and participating in and supervising the annual livestock show. On the lighter side, the annual party for the Dips has become famous and this year a commercial concern is sponsoring a banquet for the Club.

THE ACTIVITIES OF THE AGRONOMY DEPARTMENT

Many changes have taken place in the work of the Agronomy Department and much progress has been made since the Department started with the opening of the College. At the beginning as now the activities of the department were concerned mainly with breeding and cultural practice studies. In the early years improvement programs were carried on with wheat, oats, barley, rye, alfalfa, orchard grass, timothy, red clover, swedes, mangels, soybeans and corn. In more recent years breeding studies on many of the above crops have been discontinued in favour of a concentrated attack on certain crops.

At present the crops being studied are oats and barley in cereals, timothy and red clover in forage crops, corn and to a lesser extent swedes. The products of these breeding programs have taken a prominent place in Canadian agriculture to mention a few would be to name Montcalm barley, Roxton oats, Laurentian swede, Algonquin corn, Milton and Drummond timothy, and Dollard red clover.

In the production studies there are at present yield tests of all the major farm crops as well as a rather extensive program on forage production, particularly pasture. The latter is intimately associated with the problem of forage production on the farm and involves the conduct of investigations not only in the test fields of the department but also on farms throughout the province.

Finally an additional, and by no means the least important activity of the Department of Agronomy is the part that the various staff members take on Provincial and National committees and organizations. For example, staff members are active on the following National organizations - The Canadian Seed Growers' Association, The Canadian Forage Seeds Project, The Barley Improvement Institute and some of the Advisory Committees of the National Research Council. While on a provincial basis staff members are found on the Quebec Seed Board, the Quebec Fertilizer Board and in other capacities working closely with the Quebec Department of Agriculture.

DEPARTMENT OF PLANT PATHOLOGY EXPERIMENTS

In the Department of Plant Pathology at the present time, the nature of the resistance of the host plant to disease-causing organisms is under study in a number of ways.

Jacques Simard is studying cabbage yellows, a disease of the conducting tissues caused by the fungus Fusarium. By recording the reaction of host and parasite to different chemical substances, he is attempting to find a clue as to what it is in the cabbage plant that causes resistance. It is known that resistance is a genetic factor, but just what the gene or genes do to the plant to cause it to be resistant or not, is not understood.

Prof. Orvil Olsen is also working with a vascular disease caused by Fusarium, but in this case the disease is tomato wilt. By using different tomato varieties, with different degrees of resistance to the tomato wilt organism, he is trying to find out just whether or not interference with the movement of water through the stems is causing the wilt.

Dalton Wang is working on the wheat stem rust, studying the nature of resistance and susceptibility by using different chemicals with known effects on the healthy host metabolism. By the reaction of the diseased plants, he hopes to gain an insight into the chemical "make up" of the susceptible wheat plants, and thus what difference exists between resistant and susceptible plants.

Dr. Réal Pelletier is also studying the nature of resistance and susceptibility, in the same way as Dalton Wang, but using the beet leaf spot, caused by the fungus Cercospora. This work was first started by a postgraduate student, René Crête (now working apart), who found great difficulty in isolating the fungus concerned. He soon discovered that he was not alone in this predicament, and that in the U.S. and Canadian research stations, where resistant varieties of beet are being bred, no pure culture of the fungus exists. Nor could one be obtained anywhere in North America. Dr. Pelletier is, therefore, carrying on this work now that the fungus has been isolated.

Ralph Estey is working on clover root rot, a disease responsible for a great loss in vigour, and often the death of the clover plants. He is trying to determine whether it is a single organism or a group of organisms together which are responsible for the rot. This has resulted in the isolation and identification of a great many of the local soil-inhabiting fungi.

Doug Phillips is working on the physiology of the organism responsible for apple scab, Venturia, and at the moment is trying to find if there is any correlation between optical density of growth and mycelial weight.

Dr. J.G. Coulson continues his work on the market diseases of fruits and vegetables, particularly those that arise as a result of unsuitable conditions of transit and storage. The knowledge and information thus being accumulated is now regularly sought after by the shippers of Montreal.

Dr. Eric Callen is working on the internal microflora of woody tissues. Till shortly before the last World War, it was believed that healthy plant tissues

were sterile, but evidence is accumulating to show that certain fungi are present in "healthy" woody stems all the year round. The nature of this symbiosis is not known.

There are also several postgraduate students working for their degrees away from this institution this session, so no mention of their work is made here, as this account is confined to work actually being carried out in the Department of Plant Pathology at the present moment.

E.O.C.

HORTICULTURE

Research in the Horticulture Department is concerned largely with fruit and vegetable experiments with considerable emphasis on food processing. Co-operative Vegetable Trials play a large part in both undergraduate and graduate instruction because it is here that students become familiar with different strains of the older varieties and the new introductions which are intended to replace or supplement these older standards. Many of the newer ones are bred for special purposes, so it is necessary to make very close comparisons before making recommendations.

In addition to the Vegetable Trials extensive experiments are being conducted with tomatoes in an effort to increase early fruiting. These experiments include a spraying of early blossoms to induce parthenocarpic development of the fruits and the crossing of better quality late varieties with the earlier sorts in the production of first generation hybrids, and the segregation of better combinations for new introductions.

Considerable attention is also being paid to the mineral nutrition of potatoes, onions and tomatoes. Variety tests and the crossing of different rhubarb varieties are also under way. The problem here is to produce better quality and higher yielding plants for early markets and forcing.

In the field of fruit preservation Co-operative Trials are being conducted on selected tomato varieties in a study of early and total yields together with tests for vitamin A and C content, also on a study of the heat unit theory in relation to pea canning and maturity as it concerns pea varieties common to the industry in Quebec. Laboratory tests are being made on off flavour developments in frozen vegetables.

At present orchard research is largely centered upon the various tree fruits. Certain top-working experiments are in progress. These are providing data on the hardiness and compatibility of various combinations of stocks. In addition, the effects of various cultural methods upon moisture and nutritional relationships are under study.

Attention is also being paid to the mineral nutrition and the yielding ability of strawberries, raspberries, bush fruits and grapes. Strawberry breeding, with domestic and arctic varieties, is an interesting greenhouse project which is conducted by students.